Notice of Next Meeting – ASSA Johannesburg

Next meeting at Johannesburg Observatory, 18a Gill St, Observatory

Wednesday, 11 April 2012 at 7.30 pm
"Neutron Stars and Pulsars"
Sheldon R Herbst, University of Witwatersrand

Portfolio/Interest	Name	E-mail	Contact Details
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ASSA Johannesburg Mailing Lists

It is essential to join our mailing list to automatically receive alerts for all announcements, activity reminders; including public viewing, meetings, star parties and last minute changes.

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Chairman's Chat

By Gary Els

After numerous speakers and discussions at ASSA Johannesburg on Radio Astronomy, and in particular the Square Kilometer Array (SKA), April 2012 is now finally upon us when the announcement is due to be made of whether South Africa or Australia will win the bid to host the 2.1 billion dollar project.

The anticipated final announcement on 4th April is gathering interest and excitement, even in the popular media, where it is being called the "Soccer World Cup Bid" for science.

Over the past several months I have tried to establish if there isn't something that is swaying the bid in favor of one country or the other, such as, maybe less radio interference on one site compared with the other, but this criterion is equal for both bids.

The technical differences seem to boil down to a trade-off, with the Australians able to catch a larger patch of sky at any one time. In South Africa on the other hand, we will be operating at higher sensitivity - meaning that the South African antennas will look farther into the Universe or have shorter observation times.

Another factor may be the strength of the host country's astronomy community. Australia has a longer and stronger tradition of radio astronomy. South Africa has poured money into closing the gap, but we have only a small number radio astronomers at this stage.
Then there is what some see as the moral imperative for the first world to help the third world build up in science, and this may be an ideal opportunity.

How the international SKA organization will weigh the many factors involved is hard to predict. Astronomy isn't soccer, but let's hope we are successful.

Gary

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Our Website, Facebook and Postal Addresses

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P O Box 412323 Craighall 2024

New Members

The Committee would like to welcome the following new members to the ASSA Johannesburg Centre:

Member No	Name
1217	Chris Sampaio
1218	Lorrainne Marneweck

Notes on the Monthly Meeting

By Melvyn Hannibal

After **Gary Els's** opening welcome, he presented a brief history of the attempts to measure the speed of light. The first person to try this was Galileo. During the following centuries various other people have obtained speeds that became ever closer to the current value. Considering the equipment available to them, these pioneers achieved remarkable results. Currently there have been claims that this ultimate velocity is no longer as absolute as has been accepted.

Trevor Gould presented the third in his series on meteorites. The subject this time was on the methods of identifying and classifying these highly sought after alien visitors.

Barend Botha told us about the night sky touching on the close proximity of Jupiter and Venus in the evening sky, and covering a number of easy objects in Carina in the region of the "False" and "diamond" crosses.

Dave Blane informed us about his interest in variable star observations. He mentioned the need for more amateurs to take up this pursuit, which is of great use to the professional astronomers, who do not have the time to undertake the long-term observations required.

Michael Robins explained how the eye is constructed, and why we do not see the colours used in publicity photos from the Hubble space telescope. This is always a source of disappointment during public viewing events, when the viewers only see a faint patch of pale grey light. Many of these HST pictures include light of wavelengths that we cannot detect at all, such as X-rays, ultra-violet and infrared.

After the meeting, the telescope was used to observe through the clouds!!!

Clear skies

Melvyn

Upcoming Events

Friday 13 April 2012

Viewing Evening: Public viewing evening, all are welcome

Venue: Johannesburg Observatory, 18a Gill St, Observatory

Time: 19h00

Objects from the What's Up at the previous monthly meeting and Double Stars form the Showpiece List in the Cambridge Double Star Atlas will be shown. Please note: A list of double stars in a convenient altitude range for Johannesburg on Friday 13th April, and on the previous Friday, will be posted on our website

www.astronomyjhb.co.za. Members and non-members are invited to send their recommendations for public viewing from this list to the Viewing Officer, Constant Volschenk at starmanza@gmail.com.

Saturday 21 July 2012

ScopeX – Telescope and Astronomy Exhibition

Venue: Military History Museum, Saxonwold

Visit: www.scopex.co.za for more information and details of past events

Friday 18 May to Sunday 20 May 2012

Deep Sky Weekend

Venue: Marakele National Park, 20 km north of Thabazimbi

Website: http://sanparks.org.za/parks/marakele/

Contact: +27 (0)14 777 6929/6928 & 6931; 071 935 7306

Members and non-members are invited to join the Society for a weekend away at one the national parks to enjoy the sights of animals, e.g. Elephants and Rhinos, during the day and night time viewing of the heavens at the top of the Waterberg mountains, 2100m above sea level. Please book asap.

New Theory on Size of Black Holes: Gas-Guzzling Black Holes Eat Two Courses at a Time

Submitted by Annelie Hoberg

http://www.sciencedaily.com/releases/2012/03/120323134800.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily%2Fspace_time%2Fastronomy+%28ScienceDaily%3A+Space+%26+Time+News+--+Astronomy%29

March 23, 2012: Astronomers have put forward a new theory about why black holes become so hugely massive -- claiming some of them have no 'table manners', and tip their 'food' directly into their mouths, eating more than one course simultaneously. Researchers from the UK and Australia investigated how some black holes grow so fast that they are billions of times heavier than the sun.

The team from the University of Leicester (UK) and Monash University in Australia sought to establish how black holes got so big so fast. Professor Andrew King from the Department of Physics and Astronomy, University of Leicester, said: "Almost every galaxy has an enormously massive black hole in its center. Our own galaxy, the Milky Way, has one about four million times heavier than the sun. But some galaxies have black holes a thousand times heavier still. We know they grew very quickly after the Big Bang."

"These hugely massive black holes were already full-grown when the universe was very young, less than a tenth of its present age."

Black holes grow by sucking in gas. This forms a disc around the hole and spirals in, but usually so slowly that the holes could not have grown to these huge masses in the entire age of the universe. 'We needed a faster mechanism,' says Chris Nixon, also at

Leicester, "so we wondered what would happen if gas came in from different directions."

Nixon, King and their colleague Daniel Price in Australia made a computer simulation of two gas discs orbiting a black hole at different angles. After a short time the discs spread and collide, and large amounts of gas fall into the hole. According to their calculations black holes can grow 1,000 times faster when this happens.

"If two guys ride motorbikes on a Wall of Death and they collide, they lose the centrifugal force holding them to the walls and fall," says King. The same thing happens to the gas in these discs, and it falls in towards the hole.

This may explain how these black holes got so big so fast. "We don't know exactly how gas flows inside galaxies in the early universe," said King, "but I think it is very promising that if the flows are chaotic it is very easy for the black hole to feed."

The two biggest black holes ever discovered are each about ten billion times bigger than the Sun. Their research is due to published in the Monthly Notices of the Royal Astronomical Society. The UK Science and Technology Facilities Council funded the research.

A Misty Situation

By Magda Streicher

We in the southern hemisphere are so privileged to be able to observe the two Magellanic Clouds from our front veranda, in a manner of speaking. Italian explorer Amerigo Vespucci noted the Clouds as early as 1503, but it was the Portuguese explorer Ferdinand Magellan who documented them later in the 16th century and named them after himself in his report. Imagine for a moment the amazement and wonder such a sight would have evoked in those early seafarers. The LMC offer interwoven nebulae and stars in various degrees of brightness to produce a feast for the eyes – but sometimes some careful observing is required to sort through this mixed bag of goodies.

The constellation Dorado includes NGC 1955, NGC 1968 and NGC 1974, three splendid objects each with its own character and feel. A first glance reveals nebulosity in three intermingling parts. NGC 1955, the western-most nebula, is fairly round in shape, brightening slightly towards the eastern side. This part of the object envelops a few faint, almost invisible stars imbedded in nebulosity. The central area of the object displays only a few pinpoint stars. Gas flows away towards the west and collects around NGC 1968, a bright spot of nebulosity. The majority of the stars in this object are covered in haze, with a neat triangle of faint stars situated on the western edge. NGC 1968 is also the brightest object in this field of view. The haze extends further east to NGC 1974, a circular glow that houses a handful of faint stars. The southern part of this beautiful field of view displays a veil of smoke flowing away into the field of view. What a lovely, rich area to explore, with its combination of nebulosity and starlight (see photo on the next page).

Object	Type	RA	DEC	Mag	Size
NGC 1955	Cluster/Neb	05h26.1	-67o30'	9	2'
NGC 1968	Cluster/Neb	05h27.7	-67o27'	9	1.8'
NGC 1974	Cluster/Neb	05h28.0	-67o25'	9	1.7'

NGC 1955, 1968 and 1974. Photo Credit: Dale Liebenberg

Magda Streicher
magdalena@mweb.co.za

Magda—a past President of ASSA—is a passionate deep-sky observer and views from excellent, dark skies on a farm close to the Zimbabwe border. Her fascination in the stars goes back to childhood and over the past 15 years has contributed greatly to visual astronomy in SA, helping to motivate others to observe and record deep-sky objects. Using 12" and 16" Schmidt-Cassegrain telescopes, she hunts down and sketches these faint fuzzies, sharing her interest through regular talks and articles. She contributes to various deep sky sections in SA as well as publications like Canopus and Deep Sky Delights, her regular deep sky column in MNASSA (Monthly Notes of the Astronomical Society of SA). Magda has recently completed work on her book "Astronomy Delights". She contributes to various deep sky sections in SA as well as publications like Canopus and Deep Sky Delights, her regular deep sky column in MNASSA. (Monthly Notes of the Astronomical Society of SA). In appreciation of Magda's many contributions to Canopus, the Committee decided to place an advertisement for Astronomy Delights in this issue. Check the inside back cover.

Northern Lights: First Ever Measurement of Auroral Turbulence Using a Nanosatellite Radar Receiver

Submitted by Annelie Hoberg
http://www.sciencedaily.com/releases/2012/03/120322100303.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+sciencedaily%2Fspace_time%2Fastronomy+%28ScienceDaily%3A+Space+%26+Time+News+--+Astronomy%29

March 22, 2012: Researchers from SRI International and the University of Michigan have taken the first-ever measurement of naturally occurring auroral turbulence recorded using a nanosatellite radar receiver. The research was done with support from the National Science Foundation (NSF) and NASA's Educational Launch of Nanosatellites (ELaNa) Initiative.

The distinctive radar echoes recorded on March 8 were taken with the Radio Aurora Explorer (RAX) CubeSat. The RAX nanosatellite measured turbulence over Fairbanks, Alaska that was a direct result of a geomagnetic storm triggered by the largest solar flare in the past five years. Earth's high latitude ionosphere, a region of the upper atmosphere associated with solar-driven aurora or "northern lights," becomes highly unstable when large currents flow during geomagnetic storms. RAX was specifically designed by SRI and the University of Michigan to measure this auroral turbulence from an orbital vantage point inaccessible to traditional ground-based radars.

"The RAX radar echo discovery has convincingly proved that miniature satellites, beyond their role as teaching tools, can provide high caliber measurements for fundamental space weather research," said Therese Moretto Jorgensen, Ph.D., Geospace program director in the Division of Atmospheric and Geospace Sciences at the National Science Foundation.

The project's mission was to use small satellites called CubeSats to remotely explore formation of charged particle filaments created in response to intense electrical currents in space. These plasma structures, a form of turbulence called field-aligned irregularities (FAIs), can distort communication and navigation signals such as global positioning systems (GPS). During the recent solar flare, RAX measured FAI echoes using the Poker Flats Incoherent Scatter Radar (PFISR), NSF research radar operated by SRI.

"The recently collected radar echoes allow us to determine the root cause and to possibly predict future disturbances in the auroral ionosphere -- disturbances that can severely compromise communication and GPS satellites," said Hasan Bahcivan, Ph.D., a research physicist in SRI's Center for Geospace Studies, and principal investigator of the RAX mission.

A team of University of Michigan students under the direction of James Cutler, Ph.D., an assistant professor in the Aerospace Engineering Department, designed, built, and operated the satellite and gathered the radar echo data.
RAX was the first CubeSat to be selected as part of an NSF program to use small satellites for space weather and atmospheric research. The RAX CubeSat is a three-liter satellite weighing three kilograms. It was launched by NASA on October 28, 2011, and has since completed 18 experiments.

This material is based upon work supported by the National Science Foundation under Grant No. ATM-0838054.

To Leap or Not to Leap

Submitted by Andy Overbeek
http://www.usno.navy.mil/USNO/astronomical-applications/publications/Circular_179.pdf

Because of the widespread and increasing use of UTC for applications not considered three decades ago — such as precisely time-tagging electronic fund transfers and other networked business transactions — the addition of leap seconds to UTC at unpredictable intervals creates technical problems and legal issues for service providers. There is now a movement to relax the requirement that UTC remain within 0.9 seconds of UT1. The issue is compounded by the unavoidable scientific fact that the Earth's rotation is slowing due to tidal friction, so that the rate of addition of leap seconds to UTC must inevitably increase. Aside from monthly, annual, and decadal variations, the Earth's angular velocity of rotation is decreasing linearly, which means that the accumulated lag in UT1 increases quadratically; viewed over many centuries, the ΔT curve is roughly a parabola. The formulas for sidereal time, and length of the old ephemeris second to which the SI second was originally calibrated, are based on the average (assumed fixed) rate of Earth rotation of the mid-1800s (Nelson et al. 2001). All of our modern timekeeping systems are ultimately based on what the Earth was doing a century and a half ago.

An IAU Working Group on the Redefinition of Universal Time Coordinated (UTC) was established to consider the leap second problem and recommend a solution, working with the IERS, the International Union of Radio Science (URSI), the Radio communication Sector of the International Telecommunications Union (ITU-R), the International Bureau for Weights and Measures (BIPM), and the relevant navigational agencies (res. B2 of 2000). Possibilities include: using TAI for technical applications instead of UTC; allowing UT1 and UTC to diverge by a larger amount (e.g., 10 or 100 seconds) before a multi-second correction to UTC is made; making a variable correction to UTC at regularly scheduled dates; eliminating the corrections to UTC entirely and allowing UTC and UT1 to drift apart; or changing the definition of the SI second. No solution is ideal (including the status quo) and each of these possibilities has its own problems. For example, if we keep leap seconds, or a less frequent multi-second correction, can current systems properly time-tag the date and time of an event that occurs during the correction? Does a time scale that diverges from UT1 provide a legally acceptable representation of civil time? If corrections are made

less frequently, will the possibility of technical blunders increase? If leap seconds are eliminated, won't natural phenomena such as sunrise and sunset eventually fall out of sync with civil time? How do we find all the existing computer code that assumes $|UT1–UTC| \leq 0.9$ s? The matter is now being considered by the ITU-R, where a working group has proposed eliminating leap seconds from UTC entirely.

Contact Dr. Dennis McCarthy, U.S. Naval Observatory, dmc@maia.usno.navy.mil, for a copy of a report or if you wish to comment. In any event, it would take a number of years for any proposed change to take place because of the many institutions and international bodies that would have to be involved. For scientific instrumentation, the use of TAI — which is free of leap seconds — has much to recommend it. Its seconds can be easily synchronized to those of UTC (only the labels of the seconds are different). It is straightforward to convert from TAI to any of the other time scales. Use of TAI provides an internationally recognized time standard and avoids the need to establish an instrument-specific time scale when continuity of time tags is a requirement.

Blistering Hot Planet Where it Snows

By Brian Dodson
Submitted by Chris Stewart
http://www.gizmag.com/snowy-exoplanet/21777/

HD 189733 b transiting its parent star, the 8th magnitude HD 189733 (Image NASA/JPL-Caltech)

March 12, 2012: Today's weather on HD 189733 b: It will be hazy with high wispy clouds. The wind will be steady from the east at speeds approaching 6,000 miles per hour (9,656 km/h). Daytime temperatures will average a balmy 800°C (1,472°F), while the equatorial hot spot at 30 degrees longitude is expected to top 900°C (1,652°F). But, there is a high chance of silicate snow showers, with accumulations expected except in the vicinity of the hot spot.

Nighttime won't come, as our planet is tidally locked. However, if you cross to the dark side, the sunset will be a spectacular show of our orange sun fading away to a red horizon. The dark side will see a chilly 700°C (1,292°F), with intermittent snow and steady winds. "Dark side" is something of a misnomer, as the temperature is high enough that the surface gives off a dim reddish glow. The weather is expected to present the same outlook for the foreseeable future.

Just how much can astronomical observations tell us about exoplanets - those worlds orbiting other stars in our galaxy? With patience and cunning, more than you might think.

Two nearly simultaneous reports this year have revealed important new information about HD 189733 b (HDb for short). In the first, a University of Washington team used the Spitzer Space Telescope to examine how light emitted from HDb vanished when eclipsed by its sun - this was observed over several eclipses. This data provided the light intensity of a series of parallel strips on HDb's surface. These strips lay at different angles depending on whether HDb was going behind its star or was emerging from behind. Accordingly, the intensity of spots where the strips overlapped was then woven together in a sort of optical tomography to produce a two-dimensional image of the planet's surface.

In the second report, an international team with members from France, the U.K., and the U.S. used the Hubble Space Telescope to study the temperature of HDb's atmosphere as a function of pressure. They confirmed earlier reports of atmospheric haze in HDb's atmosphere, and characterized it by comparing spectrographs with Rayleigh scattering to determine that the haze particles are sub-micron in size, probably ranging from 0.1 - 0.01 microns in size. Atmospheric chemistry strongly suggests that the particles generating the haze are made of silicate minerals (probably magnesium silicate).

These results have led to a suggestion that HDb could continually experience silicate snow. In the lower atmosphere of HDb, magnesium silicate sublimates, that is, it passes directly from a solid into a gas. But we know there are small silicate particulates in the upper atmosphere. Formation of these particulates requires that the temperature be lowered, and so must have been formed at a temperature inversion in the atmosphere. The generally windy conditions would help some of the tiny particulates grow into respectable snow crystals.

Here are a few quick facts about HDb: it is an extra solar planet orbiting an 8th magnitude star at a distance of 4.65 million kilometers (2.9 million miles) and an orbital period of 2.2 days. HDb is located some 63 light-years from the Solar System. The planet is classified as a hot Jupiter planet with a diameter and mass slightly larger than Jupiter. The apparent angular size of the planet in the Earth's sky is about 15 nanoseconds of arc, so we won't be able to directly observe surface features in the foreseeable future. HDb does not appear to have any moons that are Earth-sized or larger.

Detailed photometric data of the transits have established that HDb has an atmosphere about 1,000 kilometers (621 miles) thick, with an atmospheric pressure at the optically dense surface about 40 percent of that at Earth's surface.
Spectroscopy shows that the atmosphere contains hydrogen, helium, water vapor, methane, hydrogen, carbon dioxide, sodium, and potassium. HDb would appear blue in visible light, owing to Rayleigh scattering from a haze of submicron-sized silicate particles in the atmosphere.

The skill and delicacy with which astronomers can tease unobservable information out of a few photons of light is truly amazing. They will surely continue to pick away at the mystery of what sorts of planets fill the circumstellar regions of our galaxy, leading us toward a much higher level of comfort when contemplating the possibility of alien life.

A Tribute to Celestron Founder Tom Johnson 1923-1012

Submitted by Chris Stewart
http://stargazerslounge.com/astro-lounge/180310-celestron-founder-tom-johnson-1923-2012-a.html

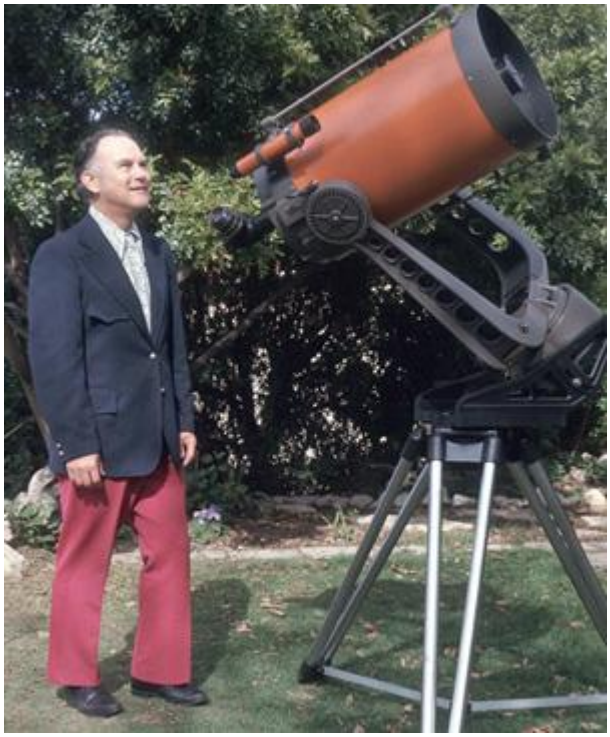
March 14, 2012: Thomas J. Johnson, the creator of the modern Schmidt-Cassegrain telescope and the founder of Celestron, died early this morning (March 13, 2012), according to Celestron president and CEO Joe Lupica. Johnson was 89. He ranked among the most important figures shaping the last half century of amateur astronomy.

Johnson was in his early 30s when, in 1955, he used his World War II experience as a radar technician, and postwar employment in the electronics industry, to establish a company called Valor Electronics. Based in Gardena, California, Valor made various components for military and industrial customers, and by the early 1960s it had expanded to roughly 100 employees.

As Valor was growing, so too was Johnson's own interest in amateur astronomy. After first purchasing 4-inch and later a 10-inch Newtonian reflector, Johnson then headed down a path followed by many amateurs of the day and turned to the hobby of telescope making. The first scope he made was an 8-inch f/4 rich-field Newtonian, soon followed by a 12-inch Cassegrain. Meanwhile, in 1960 he established an "Astro-Optical" division of Valor.

His next telescope project demonstrated that his telescope-making talent and energy would be truly formidable. This scope was a highly unconventional 18¾-inch Cassegrain, made to be transportable. To reduce the weight of the 3-inch-thick primary mirror, Johnson had a ribbed pattern sandblasted into the back of the glass blank. Six months and about $1,000 later, he had a fork-mounted scope that could be disassembled and packed into a car in about 15 minutes. Johnson's first really ambitious creation graced the cover of the March 1963 S&T.

On July 28, 1962, he hauled the scope to the parking area atop Mount Pinos for its public debut at one of the Los Angeles Astronomical Society's star parties. It made a big impression among the group's advanced amateurs, who examined it in detail. The telescope was so noteworthy that it became the cover story of Sky & Telescope's March 1963 issue.



But it was another S&T (Sky and Telescope Magazine) article that prompted Johnson to change history. As he was finishing the 18¾-inch scope, Donald Willey published a seminal analysis of Cassegrain telescope designs in the April 1962 issue. Johnson was intrigued by the excellent off-axis optical performance of the Schmidt-Cassegrain design. Based on his experience building the 18¾-inch scope and a plan to use optics made to order by Perkin-Elmer Corporation, Johnson took the bold step of advertising a 20-inch multipurpose Schmidt-Cassegrain telescope, called the "Celestronic 20" in S&T's January 1964 issue.

Left: Telescope visionary Tom Johnson poses with one of his early Celestron Schmidt-Cassegrain telescopes. (Photo: Celestron)

The Astro-Optical Division name quickly morphed to Celestron Pacific, a division of Valor. By December Valor was dropped, and Celestron's ad introduced pictures of 4-, 6-, 10-, and 22-inch Schmidt-Cassegrain telescopes as well as mention of a 36-inch. But most of Celestron's sales were for the 10-inch, which cost about $2,000 when outfitted with basic accessories.

Despite his initial arrangement with Perkin-Elmer, Johnson was soon making his own Schmidt-Cassegrain optics. A breakthrough came early on when Johnson created a method for mass-producing the telescopes' optically complex corrector plates. For this and other contributions to optics, Johnson was later awarded the Optical Society of America's David Richardson Medal; he was one of only a few non-Ph.D. optical engineers to ever receive the honor.

In the late 1960s, Johnson and his colleagues speculated that the sweet spot of the market would be for a compact, quality 8-inch portable Schmidt-Cassegrain costing around $1,000. And unlike most telescopes of the day, it should be as photography-friendly as the technology of the time allowed. Johnson returned to the drafting table, and what emerged was the $850 "classic C8," first advertised in S&T's June 1970 issue. With a radically new orange and tan motif, the C8 was an overnight hit. It set the pattern for the entire amateur Schmidt-Cassegrains that would follow in the coming decades from Celestron, its competitor Meade Instruments, and others.

Writes Celestron's president and CEO Joe Lupica: "Tom's innovative, pioneering spirit created a revolutionary method of mass producing an affordable Schmidt-Cassegrain telescope design, which allowed millions of amateur astronomers to pursue their passion for astronomy. Other notable achievements include a 1978 David Richardson Medal from the Optical Society of America, a 1993 Bruce Blair Medal from the Western Amateur Astronomers, and a 2009 Lifetime Achievement Award by the Small Telescope & Astronomical Society. Our hearts go out to Tom's wife and family and to all who were touched by his achievements and innovation."

For more about Johnson's life and how his optical innovations revolutionized amateur astronomy, see The Path of Light. Produced by Celestron two years ago, this 17½-minute documentary features interviews with Johnson and others who grew up using his telescopes.

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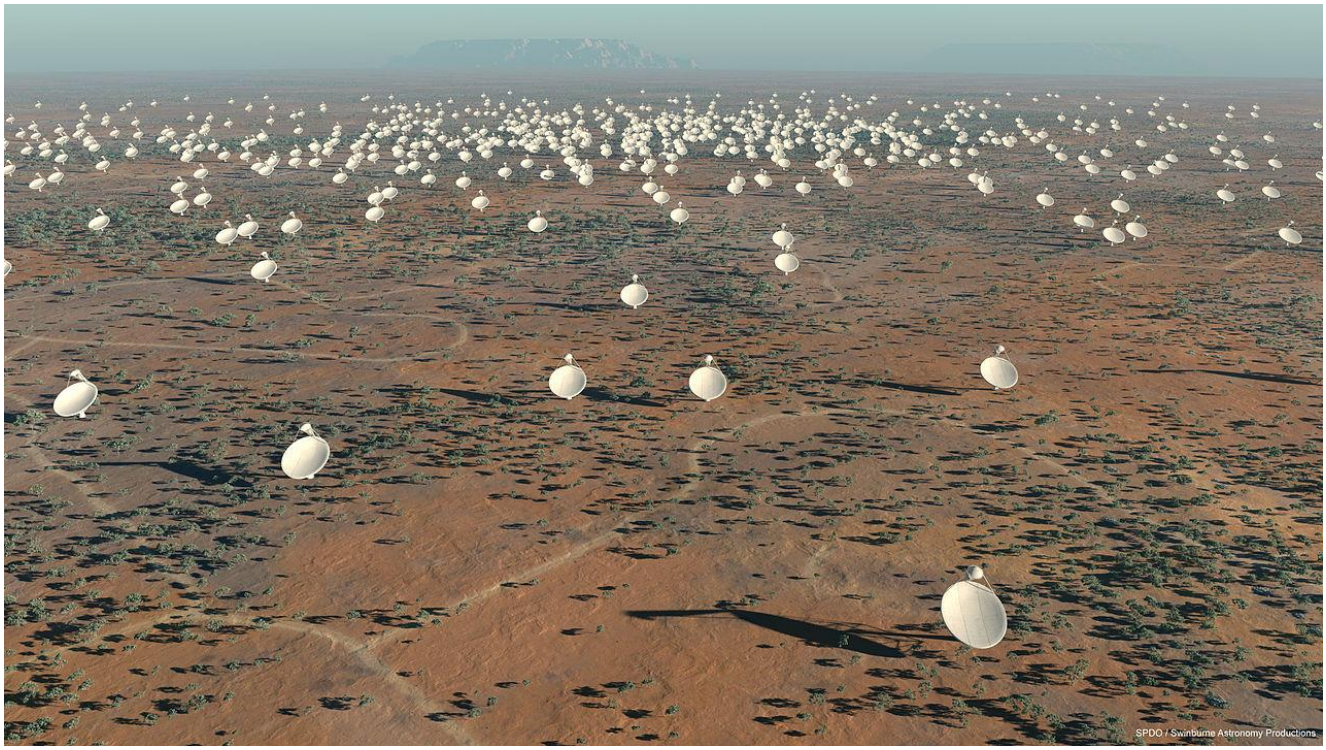
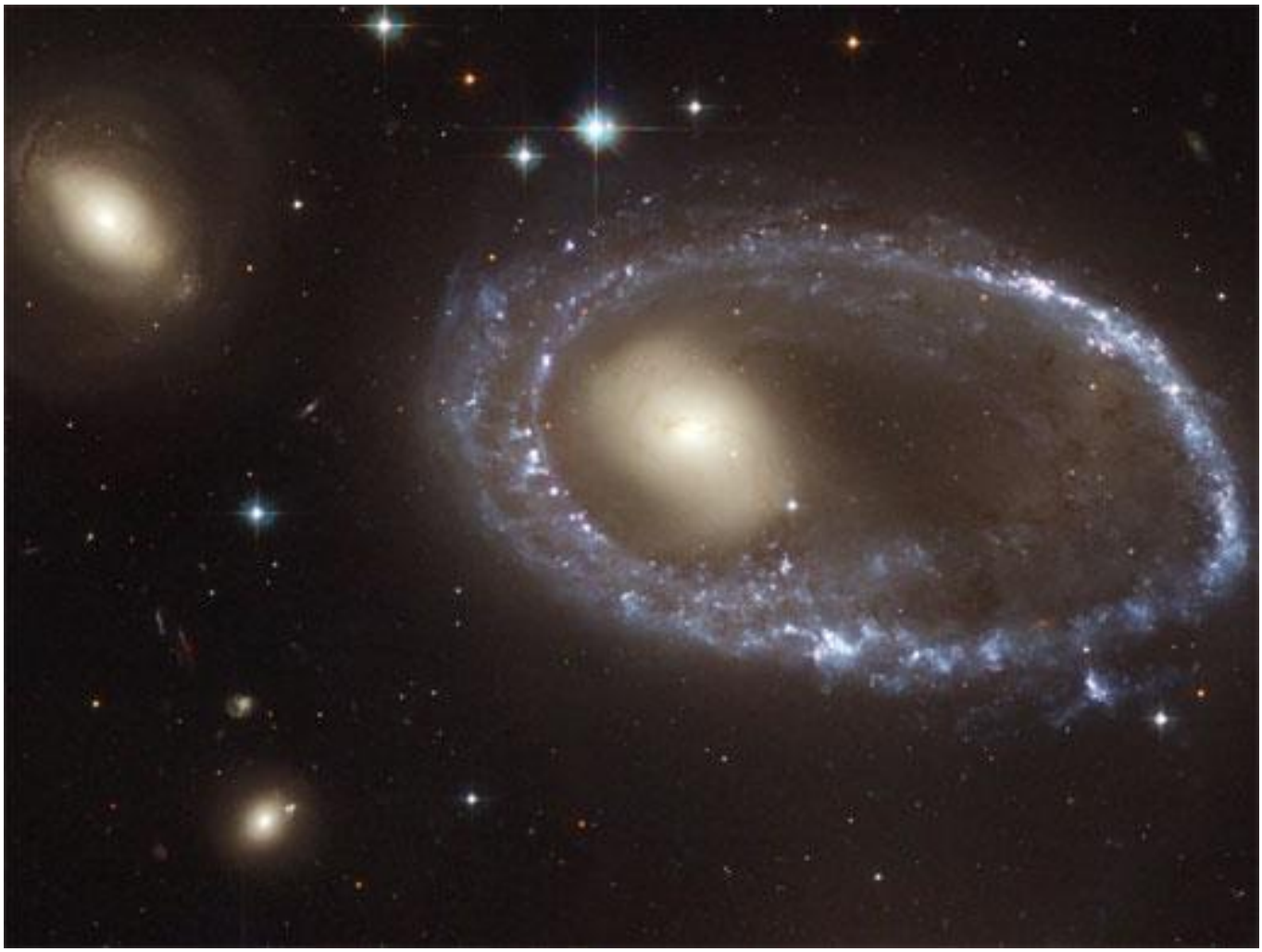


SKA: An Artist's Impression of the SKA dishes. Credit: SPDO/TDP/DRAO/ Swinburne Astronomy Productions

Sharon's APOM

Sharon Tait shares with us her favourite Astronomy Picture of the Month



The Lure of the Rings

Image credit: NASA/ESA/Hubble Heritage Team (AURA/STScI)

Resembling a diamond-encrusted bracelet, a ring of brilliant blue star clusters wraps around the yellowish nucleus of what was once a normal spiral galaxy in this image from NASA's Hubble Space Telescope (HST). This image is being released to commemorate the 14th anniversary of Hubble's launch on April 24, 1990 and its deployment from the space shuttle Discovery on April 25, 1990. The galaxy, catalogued as AM 0644-741, is a member of the class of so-called "ring galaxies." It lies 300 million light-years away in the direction of the southern constellation Dorado.
http://www.nasa.gov/multimedia/imagegallery/image_feature_165.html

The Sky this Month

Data provided by Constant Volschenk

Twilight Report for 2012/04/01 to 2012/04/30

Date	Sun		Astronomical		Nautical		Civil	
	Rise	Set	Begin	End	Begin	End	Begin	End
2012/04/01	06:17	18:06	04:57	19:26	05:24	18:59	05:50	18:32
2012/04/08	06:20	17:58	05:00	19:19	05:27	18:52	05:54	18:25
2012/04/15	06:24	17:52	05:03	19:12	05:30	18:45	05:57	18:19
2012/04/22	06:27	17:45	05:06	19:06	05:33	18:39	06:00	18:12
2012/04/29	06:31	17:39	05:09	19:01	05:36	18:34	06:03	18:07

Twilight is the interval of time in the morning or evening when the sun is below the horizon yet perceptibly contributes to sky glow. There are three geometrical definitions for the end of evening twilight or the start of morning twilight: (1) Civil Twilight – center of the Sun 6° below the horizon, brightest stars and planets visible, marks start and end for the purposes of aviation and artificial lighting of ordinary outdoor activities; (2) Nautical twilight – Centre of Sun 12° below horizon, horizon indistinct; (3) Astronomical twilight – center of the Sun 18° below horizon, negligible solar component of sky glow.

Planet Visibility

	Mercury		Venus		Mars		Jupiter		Saturn	
Date	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
2012/04/01	05:01	17:09	09:52	20:21	16:21	03:37	08:40	19:43	18:53	07:32
2012/04/08	04:33	16:49	09:56	20:16	15:50	03:06	08:20	19:21	18:24	07:02
2012/04/15	04:23	16:37	09:56	20:10	15:21	02:37	08:00	18:59	17:55	06:32
2012/04/22	04:26	16:32	09:54	20:02	14:53	02:11	07:39	18:37	17:26	06:02
2012/04/29	04:38	16:31	09:46	19:52	14:28	01:48	07:19	18:15	16:57	05:32